

IN THE CLAIMS

Please amend the claims as indicated below:

1-12. Please cancel.

13. (original) An apparatus for determining position of a valve member relative to a valve contact surface, wherein the member is operatively connected to an actuator, comprising:

an actuator control circuit operatively connected to the actuator and operable to apply a control signal to the actuator, the control signal controlling movement of the member relative to the contact surface, and operable to receive an output from the actuator; and

a seat detection circuit operatively connected to the actuator control circuit and operable to determine contact of the member with the contact surface from the output;

wherein the actuator is a piezoelectric device.

14. (original) The apparatus, as set forth in claim 13, wherein the output comprises a voltage produced by the actuator.

15. (original) The apparatus, as set forth in claim 14, wherein the seat detection circuit determines a rate of change of the output.

16. (original) The apparatus, as set forth in claim 15, wherein the seat detection circuit determines contact of the member with the contact surface from a comparison of the rate of change of the output to a predetermined value.

17. (original) An apparatus for controlling velocity of a valve member relative to a valve contact surface, wherein the member is operatively connected to an actuator, comprising:

an actuator control circuit operatively connected to the actuator and operable to apply a control signal to the actuator, the control signal controlling movement of the member relative to the contact surface, and operable to receive an output from the actuator;

a seat detection circuit operatively connected to the actuator control circuit and operable to determine contact of the member with the contact surface from the output; and

a velocity control circuit operatively coupled to the actuator control circuit and seat detection circuit and operable to provide an input to the actuator control circuit for controlling velocity of the member;

wherein the actuator is a piezoelectric device.

18. (original) The apparatus, as set forth in claim 17, further comprising:
a position control circuit operatively connected to the actuator control circuit, the seat detection circuit, and the velocity control circuit, the position control circuit having a stored charge value and a current charge value.

19. (original) The apparatus, as set forth in claim 18, wherein the position control circuit determines a charge error as a function of the stored charge value and the current charge value.

20. (original) The apparatus, as set forth in claim 19, wherein the velocity control circuit determines the input as a function of the charge error.

21. (original) The apparatus, as set forth in claim 18, wherein the position control circuit includes an integrator operable to integrate current flowing through the actuator during a current actuation cycle to determine the current charge value.

22. (original) The apparatus, as set forth in claim 21, wherein the stored charge value is determined by the seat detection circuit during a prior actuation circuit.

23 – 26 Please cancel.